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<b>(54) Title:</b> METHOD AND APPARATUS FOR CUTTING INDEX TABS		
<b>(57) Abstract</b>  <p>A method of realizing an index in one edge of a book comprises the steps that a number of sheets which are to be allocated an index tab are counted off and provided with recesses for forming the index tabs, and that this is repeated until the intended number of index tabs has been formed. At least certain of the sheets are provided with a machine-readable code and the sheets are flipped through, whereupon the flip operation is arrested when the code indicates that the correct sheet has been located. An apparatus for realizing an index in one edge of a book comprises a holder device (4) for the sheets (1) of the book, a punch (11) for punching recesses in the edge of the sheets (1) for forming index tabs, counter means (14, 15) for counting, in the book, such numbers of sheets as are to be allocated each index tab and provided with corresponding recesses. The counter means include a machine-readable code on the sheet (1) and a reader herefor, a flip wheel (14) and a sheet holder (15) and a control unit which arrests the flip operation when the reader has located the correct sheet.</p>		

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## METHOD AND APPARATUS FOR CUTTING INDEX TABS

### TECHNICAL FIELD

- 5 The present invention relates to a method for realizing an index in one edge of sheets arranged in a stack, for example a telephone directory or the like, comprising the steps that a first number of sheets to be allocated a first index tab is counted off from the stack, that these sheets are provided in their edges with recesses of a first size and/or location, that a second
- 10 number of sheets to be allocated a second index tab is counted off from the stack, and that these sheets are provided in their edges with recesses of a second size and/or location, and that this procedure is repeated until the intended number of index tabs has been completed.
- 15 The present invention also relates to an apparatus for realizing an index in one edge of sheets arranged in a stack, for example a telephone directory or the like, comprising a holder device for the stack, a punch, cutter or guillotine device for making recesses in the edge of the sheets for forming index tabs, counter means for counting off from the stack such determined
- 20 numbers of sheets as are to be allocated each index tab and provided with recesses in correspondence therewith.

### BACKGROUND ART

- 25 Many different fields of technology suffer from the problem of counting the number of sheets included in a stack or counting off from a stack a given number of sheets. By way of concrete example of such technology, mentioned might be made of banknote counting machines.
- 30 In equipment for banknote counting, the banknotes are counted in that each individual note is grasped by a suction nozzle or suction cup which lifts up a part of the banknote from the stack or wad without breaking the wad. The counting of the banknotes is effected in that the number of movement strokes of the suction nozzle or suction cup is registered.

If operational reliability is not 100%, substantial errors will be obtained using this technology in the registered quantity if, for example, certain banknotes are leapfrogged such that the suction nozzle moves empty during one or more working cycles. Thus, in such a design and construction, large cumulative errors may occur.

In banknote counting, it is also known to break up a wad of banknotes and displace the banknotes with the aid of a transfer mechanism which peels off banknote after banknote from the wad. According to this prior art technology, each banknote is registered as displaced from the one stack or wad to the other, for which reason the risk of cumulative errors of the above-outlined type is obviated. However, this technology cannot be applied in respect of flipping or leafing through books which are to be punched so as to form indexes, since the book is already bound or stapled when the index punching is to be carried out.

One fundamental difference also applies between punching of indexes and the above-outlined banknote counting in that the banknote counting operation has as its point of departure the counting off from a stack or wad of a certain number of notes or answering the question how many banknotes were there in the wad or stack.

As far as index punching is concerning, the actual number involved is of no interest and the problem is instead that of localizing the sheet where the punching operation is to begin and where, for example, the index letter is to be found. In order to locate these sheets, it is not necessary to count all interjacent sheets.

## **PROBLEM STRUCTURE**

The present invention has for its object to realize a method of the type mentioned by way of introduction, this method being designed so as to make for reliable and efficient location of those sheets where punching is to be carried out. The invention further has for its object to devise a method which offers a very high capacity which can be put into effect fully automatically and with a high degree of precision in the ensuing result.

- The present invention yet further has for its object to design the apparatus intimated by way of introduction in such a manner that this offers a high degree of rapidity, exact precision and great operational reliability. The invention yet further has for its object to devise an apparatus which is
- 5 simple and economical in manufacture and which can operate fully automatically.

### SOLUTION

- 10 The objects forming the basis of the present invention will be attained in respect of the method, if this is characterized in that at least certain of the sheets are provided with a machine-readable code; that, on the counting-off operation, the sheets are flipped through one or more at a time, the code being read off; and that the flip operation is arrested when the code
- 15 indicates that the correct sheet has been located through the flip operation.

- The objects forming the basis of the present invention will be attained in respect of the apparatus, if this is characterized in that the counter means include a machine-readable code on at least certain of the sheets, a reader
- 20 for sensing the code, a flip device which, on counting of sheets, is operative to flip the sheets one or more at a time, and a control unit which is operative to arrest the flip operation when the reader has registered the correctly flipped sheet and to restart the flip operation when the flipped sheet has been displaced.

- 25 In one preferred embodiment of the apparatus, it also suitably applies that the holder device includes a table for supporting the stack of sheets, there being also provided, along one edge portion of the table, a clamping device for positionally fixing a portion of the stack, and the reader, the flip device
- 30 and a sheet holder for fixedly retaining against the table portions of sheets in the process of being flipped through being disposed a distance from the clamping device and carried by or together with the table.

- The advantageous embodiment of the present invention is suitably also
- 35 further characterized in that the flip device includes a wheel drivable by drive means, the wheel being urged against those sheets which are to be

flipped, the wheel being drivable in one direction in which its point of contact against the sheets moves towards the portion of the stack fixedly retained by the holder device.

- 5 Further advantages will be attained according to the present invention if the method is also given one or more of the characterizing features as set forth in appended Claims 2 to 7 and if the apparatus is given one or more of the characterizing features as set forth in appended Claim 10.

## 10 BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

The present invention will now be described in greater detail hereinbelow, with particular reference to the accompanying Drawings. In the accompanying Drawings:

15

Fig. 1 schematically illustrates an extremely simplified side elevation (or an extremely simplified section taken along the section marking A-A in Fig. 6) of the table and clamping device of the subject matter of the present invention in which a stack is about to be fed into the clamping device;

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Fig. 2 is a view corresponding to that of Fig. 1 with the stack fixedly clamped in the clamping device;

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Fig. 3 is a view corresponding to those of Figs. 1 and 2 in which the stack has been bent by pivoting of the clamping device;

Fig. 4 is a view corresponding to those of Figs. 1 - 3, the table and the clamping device having been pivoted to the flip position;

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Fig. 5 is a view corresponding to that of Fig. 4, but on a larger scale;

Fig. 6 is a vertical side elevation of the subject matter of the present invention seen in a horizontal direction from the punch device; and

35

Fig. 7 is a view seen in the same direction and from the same position as Fig. 6, the table and the clamping device being pivoted to the flip position.

## 5 DESCRIPTION OF PREFERRED EMBODIMENT

In its most generic embodiment, the present invention entails that a stack of sheets which are bound, stapled or otherwise bonded into book form and which are to be provided with index tabs at one edge opposed to the bound edge along the edge where the index tabs are to be made, are provided with a machine-readable code so that at least certain of the sheets can be identified by reading-off this code. The stack is placed in a suitable apparatus and fixedly clamped, whereafter the individual sheets are flipped through in that a rotating wheel or other suitable flip device is pressed against them and flips one or more sheets at a time. In this instance, the wheel is suitably applied against the upper or lower edge portion of the stack (the book) so that the flip operation folds up a corner of each flipped sheet, while the opposing portion of the sheet is retained in abutment against the remaining stack (the book). When a suitable sheet is identified by reading off the codes of the sheets, the holder releases its grip, whereafter the retrieved sheet is pivoted to a punching apparatus which punches out a recess in the edge of the retrieved sheet. During this punching operation, the remaining sheets are held in position in the stack under the action of the wheel.

It should be emphasized that it is sufficient to identify those sheets where punching of each index tab is to be made. Consequently, it would be sufficient to encode precisely these sheets or to encode a small number of sheets immediately ahead of these sheets.

In Fig. 1, reference numeral 1 relates to a stack of sheets which are united to form a book or a booklet at one joint region 2. If the stack of sheets is to constitute a bound book with hard covers or cases, the index tabs are punched in the edge 3 before the cases of the book are applied.

The stack 1 is positioned on a table 4 with the joint edge 2 first in the direction of the arrow 6 so that the joint edge 2 passes through a clamping device 5 which comprises two rollers 7 and 8. The rollers 7 and 8 are, on either side of the stack 1, and also on either side of the table 4 (seen in a direction which is at right angles to the plane of extent of the Drawing in Fig. 1), interconnected with one another by the intermediary of an operating rod 9 so that thereby the upper roller 7 may be drawn towards and away from the lower roller 8 by activation of that drive means 10 which is placed beneath the lower roller 8 and which is connected to the operating rod 9.

5     1) interconnected with one another by the intermediary of an operating rod 9 so that thereby the upper roller 7 may be drawn towards and away from the lower roller 8 by activation of that drive means 10 which is placed beneath the lower roller 8 and which is connected to the operating rod 9.

10    The drive means 10 may be a pneumatic or hydraulic cylinder, a screw mechanism, an electromagnetic prime mover or the like.

Fig. 2 shows how the stack or book 1 has been passed through the clamping device 5 and clamped in between the two rollers 7 and 8. In such instance, the greater part of the book 1 rests on the table 4 and the joint edge 2 extends past and outside the two rollers 7 and 8.

15    the greater part of the book 1 rests on the table 4 and the joint edge 2 extends past and outside the two rollers 7 and 8.

The distance from the edge 3 where the index punching is to be made and to the centre of the lower roller 8 is determined partly by the size of the punching and partly by the distance between this roller and the punch device 11 intimated in Fig. 3.

20    the distance from the edge 3 where the index punching is to be made and to the centre of the lower roller 8 is determined partly by the size of the punching and partly by the distance between this roller and the punch device 11 intimated in Fig. 3.

The punch device 11 includes a lower knife 12 and an upper knife 13, and the lower knife may be considered as fixed while the upper knife is movable in a direction up and down for cooperating with the lower knife.

25    the lower knife may be considered as fixed while the upper knife is movable in a direction up and down for cooperating with the lower knife.

In Fig. 3, the clamping device with the rollers 7 and 8 has been pivoted through 90° in a counterclockwise direction about the centre axis of the lower roller 8. It will be apparent from Fig. 3 that the drive means 10 (the left-hand drive means in Fig. 6) has been pivoted together with the roller 8 to a position beyond the table 4 and the book 1, counting from the observer.

30    the drive means 10 (the left-hand drive means in Fig. 6) has been pivoted together with the roller 8 to a position beyond the table 4 and the book 1, counting from the observer.

As a result of the bending carried out of the book 1 over the lower roller 8, a displacement has been achieved of the sheets included in the book 1 so that, after this bending, the edge 3 will be oblique in the manner illustrated in the Figure.

35    the edge 3 will be oblique in the manner illustrated in the Figure.



In Fig. 3, there are also intimated a flip wheel 14 and a sheet holder 15 which have been omitted from Figs. 1 and 2 but are also shown in Figs. 4 and 7.

- 5 In Fig. 4, both the table 4 and the clamping device have been rotated a further 90° in a counterclockwise direction about the centre axis of the lower roller 8 which is now located at a higher level than the upper roller 7.

10 It will be apparent from the foregoing that the table 4 is pivotal about the centre axis of the lower roller 8 and that the clamping device, i.e. that unit which is formed by the two rollers 7 and 8, a flip support 16 and the cylinders 10, is also pivotal about this centre axis. The pivotal movement of the clamping device is operated by drive means (not shown in Figs. 1 - 4) such as a cylinder which connects the clamping device to the table 4 so that  
15 thereby, in each selected position of rotation of the table 4, the clamping device may be rotated in relation to the table.

In Fig. 4, the table has, as mentioned above, been pivoted up to a flip position and it will be apparent that both the flip wheel 14 and the sheet  
20 holder 15 have accompanied this movement. In order to make this possible, the flip wheel 14 is, with its drive motor and the sheet holder 15, suspended so as to accompany the movements of the table and can thereby be suspended directly in the table or in that carrier member which in turn carries the table proper.

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In Fig. 4, the flip support 16 extends straight out towards the upper surface of the lower knife, and the upper surface of the flip support lies approximately flush with the upper surface of the lower knife.

30 In Fig. 4, the flip operation proceeds in such a manner that the flip wheel 14 is set in motion in accordance with the arrow (see also Fig. 7) so that the portion of the flip wheel abutting against the book moves in a direction towards the clamping device and towards the flip support 16. In such instance, the outermost sheet in that corner portion of the stack or book 1  
35 against which the flip wheel abuts will be displaced in a downward direction so that it releases its grip with the flip wheel. The portion of the sheet most

proximal the observer in Fig. 4 is, however, retained against the book with the aid of the sheet holder 15 so that a released sheet is prevented from falling down towards the flip support 16.

- 5 At the edge 3 and at those points which are to be punched away in the punch device 11, the sheets in the stack 1 are provided with machine-readable codes 17 which are arranged so as to indicate the beginning and possibly also the end of that number of sheets which are to be punched in the punch device 11 in the same manner and which, thereby, are to have the same gripping tab. When the correct code 17 has been registered by a  
10 code reader (its position is intimated by broken lines 18 in Fig. 7), a predetermined number of sheets will, with their distal corner portion, be located on the left-hand side of the flip wheel 14 while the corner portion located most proximal the observer is fixedly retained by the sheet holder  
15 15. In this position, the flip wheel 14 is arrested and the sheet holder 15 is moved aside so that the counted number of sheets is released. This implies that the counted number of sheets is pivoted under the force of gravity or with the aid of an air jet in a counterclockwise direction down to a position along the flip support 16 and with the edge portion 3 resting on the left-hand  
20 side of the lower knife 12. In this position, the upper knife 13 is lowered so that the intended recess is punched into the counted number of sheets. Thereafter, the knife 13 is once again raised and the punched number of sheets forced down beneath the lower knife 12. Simultaneously with the punching or after the depression of punched sheets, the sheet holder will  
25 once again have been moved to the position shown on the Drawings and the flip wheel 14 once again have been set in motion. In such instance, it is of no consequence whether the flip wheel is driven in such a manner that, at the beginning of or during a flip sequence, it flips through several sheets at a time, as long as the flip operation can be effected with one sheet at a  
30 time in the vicinity of those codes which the reader 18 registers.

Before the next punching operation is carried out, a relative displacement also takes place of the book (the table 4 with the clamping device) and the punch device 11 in the longitudinal direction of the rollers 7 and 8.

Fig. 5 shows, on a larger scale, the clamping device 5, the lower portion of the table 4 and the punch device 11. In this Figure, the flip operation of a predetermined number of sheets and the punching thereof have proceeded to such an extent that a number of groups of sheets 19 have been ready-punched and are downwardly folded beneath the lower knife 12 while one group of sheets 20 is located on the lower knife 12 and remaining groups 21 of sheets as yet unflipped from the book 1. In that position which the different components have in Fig. 5, it may be assumed that the group 20 of sheets which is located on the knife 12 is still not yet punched. In this position, a holder 22 is forced down towards the group 20 and the upper side of the knife 12, the holder positionally fixing this group of sheets which is now to be punched against the knife 12. It will also be apparent from the Figure that the upper knife has two edges 23 and 24 making an angle with one another, where the edge 24 lies in the plane of the Drawing, while the edge 23 makes a right angle with the plane of the Drawing. Correspondingly, the lower knife 12 has a cross edge 26 which cooperates with the cross edge 24 of the upper knife 13 and a longitudinal edge 25 which cooperates with the longitudinal edge 23 of the upper knife 13.

Once the holder 22 has been lowered to urge the group 20 towards the knife 12, the punching is effected in that the upper knife 13 is lowered with the edges 23 and 24 at least down to a level flush with the edges 25 and 26 but preferably somewhat further. Thereafter, the upper knife is once again raised, whereupon the holder 22 is also returned upwardly to its starting position. Simultaneously with the return stroke of the knife 13 and the holder 22, a plunger 27 may be activated and be forced in a downward direction so that the punched group 20 of sheets is moved down on the upper side of the downwardly bent groups 19 below the lower knife 12. Before the next punching operation is carried out, relative displacement also takes place along the longitudinal direction of the rollers 7 and 8 between the punch device 11 and the clamping device 5 with the table 4.

With the position of adjustment which is applied during the punching operation according to Figs. 4, 5 and 7, the edges of the punchings will be at right angles to the front and rear faces of the book. If, instead, a punching is desired which is obliquely inclined in the same manner as the edge 3

slopes in relation to the major portion of the plane of extent of the book 1 in Fig. 3, the clamping device 7, 8 in Fig. 4 is turned slightly in a counterclockwise direction so that the flip support points slightly obliquely upwards. This will have as a consequence that the group of sheets 20 which is to be punched will be bent, for which reason the edges 3 of the individual sheets will be offset in relation to one another in the punching position. When, in this position, the punching is made straight, the punched incision surface will, after return twisting of the group to the flat state, be oblique in relation to the plane of extent of the sheets.

10

Fig. 6 shows the subject matter of the present invention seen from the punch device 11, i.e. from the left in Figs. 1 - 5, in which event the table 4 and the rollers 7 and 8 are located in the starting position according to Fig. 1. It will be apparent from the Figure that the apparatus includes a frame portion 28 which is displaceably disposed in accordance with the double-headed arrow 29 in a frame (now shown on the Drawings) for the machine. This displacement according to the arrow 29 is carried out between punching of each group of sheets so that, thereby, the punched recesses will obtain the correct position in the longitudinal direction of the edge 3 of the book. This displacement according to the arrow 29 constitutes an alternative to the above-mentioned relative displacement between the table 4 (shown by broken lines behind the roller 8) and the punch device 11.

The frame portion 28 has upwardly directed shanks 30 with guides 31 in which carriers 32 are vertically adjustably accommodated, the carriers having journals 33 for pivotally supporting the roller 8. For revolving the roller 8, this is provided with a transmission 34 which connects it to a drive motor 35 which is carried by the carrier 32 or is movable together therewith.

As was mentioned above, the table 4 is pivotal about the centre axis of the roller 8 and is carried by the roller via journals 36 and carrier arms 37. Furthermore, the roller 8 is interconnected with the table 4 for mutual rotation via a linkage 38 and a prime mover (not shown), for example a pneumatic or hydraulic cylinder or the like, which is placed on the underside of the table 4 and is secured in the table.

As was mentioned above, a reader 18 reads off the code 17 on a sheet 1 which is fixedly clamped on the table 4. This reader is adjustable in relation to the table but is also arranged in such a manner that it accompanies the table in its pivotal movements. For example, the reader 18 may be movable  
5 along an arm 39 which is secured in the journal 36 or possibly directly in the table.

Fig. 7 shows the table raised to the flip position (Cf. Figs. 4 and 5), i.e. pivoted 90° in relation to the position according to Fig. 6. It is apparent from  
10 this Figure that the flip wheel 14 has a drive motor 40 which is secured in a suspension 41 which may be disposed directly on the table 4 or on some other component which is pivotal together with the table. The suspension is such that the flip wheel 14 can be lifted away a distance from the table 4 on  
15 insertion of a book (as intimated in Fig. 1), whereupon the flip wheel can be applied against the book with suitable and adjustable pressure. In such instance, it should be observed that the adjustment possibilities of the suspension 41 also include the possibilities of catering for books of different thicknesses.

20 The sheet holder 15 is, as was intimated above, disposed in such a manner that it accompanies the table 4 in its pivotal movements. To this end, the sheet holder may be disposed and secured directly on the table but may also be placed on some other component which accompanies the table in its movements. Furthermore, the sheet holder 15 is removable so that it  
25 does not prevent insertion of a book (according to Fig. 1) and further, it is coupled to drive means (not shown on the Drawings), permitting disengagement from the engagement position with the book when a counted number of sheets is to be released folded down for punching.

30 As was intimated above, assistance may possibly be needed for a group of counted sheets to be pivoted down to the punching position when the group is released by the sheet holder 15. For this reason, the apparatus shown on the Drawings can be supplemented with a compressed air nozzle which assists in the above-mentioned downward bending of the sheet group. Like  
35 the flip wheel 14 and the sheet holder 15, such a nozzle is suitably disposed so that it accompanies the movements of the table 4.

## DESCRIPTION OF ALTERNATIVE EMBODIMENTS

5 It has been disclosed above that the flip device comprises a flip wheel which, by friction against the sheets, flips through them. As one alternative, use may be made of a device with suction nozzles which grip sheet after sheet and thereby flip through the sheets. One such a device may be rotary, with a plurality of nozzles, but may also operate with a single nozzle in a reciprocating movement.

10 It has been described above how relative displacement takes place in the longitudinal direction of the rollers 7 and 8 between the rollers and the punch device 11 between each punching operation. Such a displacement regulates the length of that strip which is punched off along the edge 3. In certain cases, double index tabs may be relevant. In order to achieve this,  
15 the distance between the punch device 11 and the rollers 7 and 8 is also modified.

Concerning the suspension of the flip wheel 14, it has been disclosed in the foregoing that the suspension is such that the flip wheel accompanies the  
20 table 4 in its movements. In such situations in which the book is thick, the slope of the edge 3 of the book may be considerable and the edge correspondingly wide. This would imply that the position of the point of engagement of the flip wheel with the different sheets would be changed according as the flip operation proceeds, so that the point of engagement  
25 lies closer to the edges of the sheets at the beginning of the flip operation in order subsequently to be moved inwards away from the edge. In order to avoid this situation, it may be appropriate to design the suspension of the flip wheel 14 so that it can also move in a direction which is parallel with the plane of the table and at right angles to the longitudinal direction of the  
30 edge 3.

Finally, as one alternative to the drive motor 35 and the transmission 34 shown in Fig. 6, use may be made of a cylinder unit which acts between the  
35 table 4 (or a part connected thereto) and the carrier 32.

The present invention may be modified without departing from the spirit and scope of the appended Claims.

**WHAT IS CLAIMED IS:**

1. A method of realizing an index in one edge (3) of sheets arranged in a stack (1), for example a telephone directory or the like, comprising the steps  
5 that a first number of sheets to be allocated a first index tab is counted off from the stack (1), that these sheets are provided in their edges (3) with recesses of a first size and/or location, that a second number of sheets to be allocated a second index tab is counted off from the stack, and that these sheets are provided in their edges (3) with recesses of a second size and/or  
10 location, and that this procedure is repeated until the intended number of index tabs has been completed, **characterized in that** at least certain of the sheets are provided with a machine-readable code (17); **that**, on the counting-off operation, the sheets are flipped through one or more at a time, the code being read off; **and that** the flip operation is arrested when the  
15 code indicates that the correct sheet has been located through the flip operation.
2. The method as claimed in Claim 1, **characterized in that** the sheet in the process of being counted off is held with a portion thereof in a position  
20 against the stack; **and that** the sheets in a complete number of counted-off sheets are transferred together, for example bent, to a position where the recess is made in their edge.
3. The method as claimed in Claim 1 or 2, **characterized in that** the stack  
25 (1) is held positionally fixed along a portion (2) which is substantially parallel with that edge portion (3) where the recesses are made; **that** the stack (1), between the positionally fixed portion and that portion where the flip operation is carried out, is held bent at an angle; **that** counted-off sheets are bent back towards or past the direction of the sheets in the positionally  
30 fixed portion for realizing the recesses; **and that** recessed sheets are bent further an additional angle when the recesses have been made.
4. The method as claimed in any one of Claims 1 to 3, **characterized in that** the a relative displacement between the stack (1) and that device (11)  
35 which makes the recesses takes place between the making of the different recesses.



5. The method as claimed in any one of Claims 3 or 4, **characterized in that** the the stack (1) is displaced parallel with its plane of extent in one insertion direction (6); **that** the stack is positionally fixed and bent; **that** the bent stack is pivoted to a treatment position where counting-off of the sheets takes place and the recesses are made; **and that** the sheets are bent back towards straight position and at least partly pivoted back from the treatment position whereafter the stack is released and removed.
6. The method as claimed in any one of the preceding Claims, **characterized in that** the flip operation is achieved in that a wheel (14) is brought into contact with the stack (1) and set in rotation.
7. The method as claimed in any one of the preceding Claims, **characterized in that** the code (17) is placed on those portions of the sheets which are removed on making the recesses.
8. An apparatus for realizing an index in one edge of sheets arranged in a stack (1), for example a telephone directory or the like, comprising a holder device (4, 5) for the stack (1), a punch, cutter or guillotine device (11) for making recesses in the edge of the sheets for forming index tabs, counter means (14, 15, 17, 18) for counting off from the stack (1) such predetermined numbers of sheets as are to be allocated each index tab and provided with recesses in correspondence therewith, **characterized in that** said counter means include a machine-readable code (17) on at least certain of the sheets, a reader (18) for sensing the code, a flip device (14, 15) which, on counting off of sheets, is operative to flip the sheets one or more at a time, and a control unit which is operative to arrest the flip device (14, 15) when the reader (18) has registered the correctly flipped sheet and to restart the flip operation when the flipped sheet has been displaced.
9. The apparatus as claimed in Claim 8, **characterized in that** the holder device includes a table (4) for supporting the stack (1), there being disposed, along one edge portion of the table, a clamping device (5) for positionally fixing a portion of the stack (1), and there being disposed, a distance from the clamping device (5), and carried by or together with the table (4), the reader (18), the flip device (14) and a sheet holder for fixedly

retaining against the table (4) portions of sheets in the process of being counted.

- 5 10. The apparatus as claimed in Claim 8 or 9, **characterized in that** the flip device includes a wheel (14) drivable by drive means (40), the wheel being urged against those sheets which are to be flipped through, the wheel (14) being drivable in one direction in which its point of contact with the sheets moves towards the portion of the stack (1) fixedly retained by the holder device.

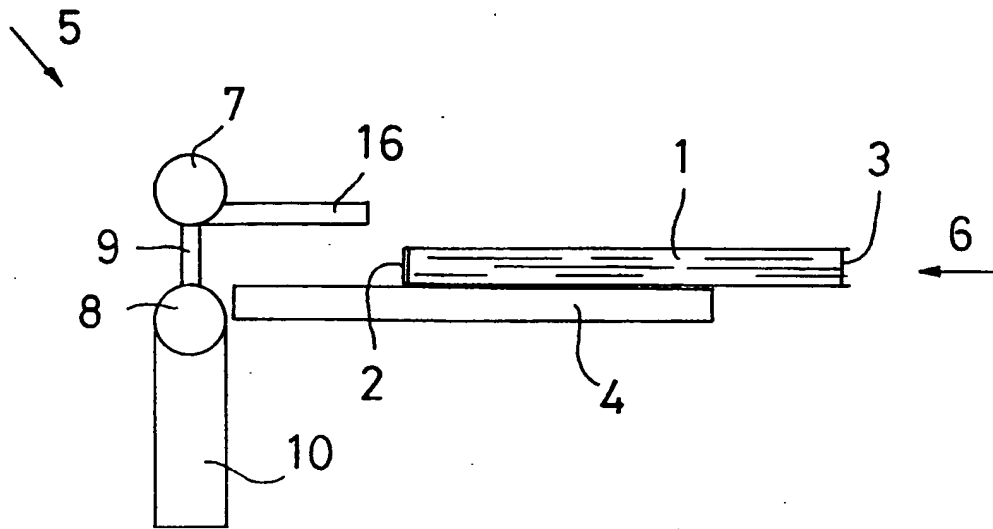


Fig 1

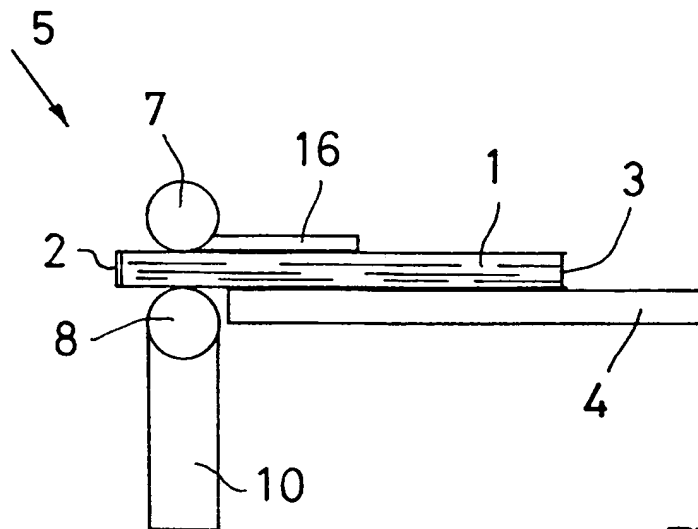


Fig 2

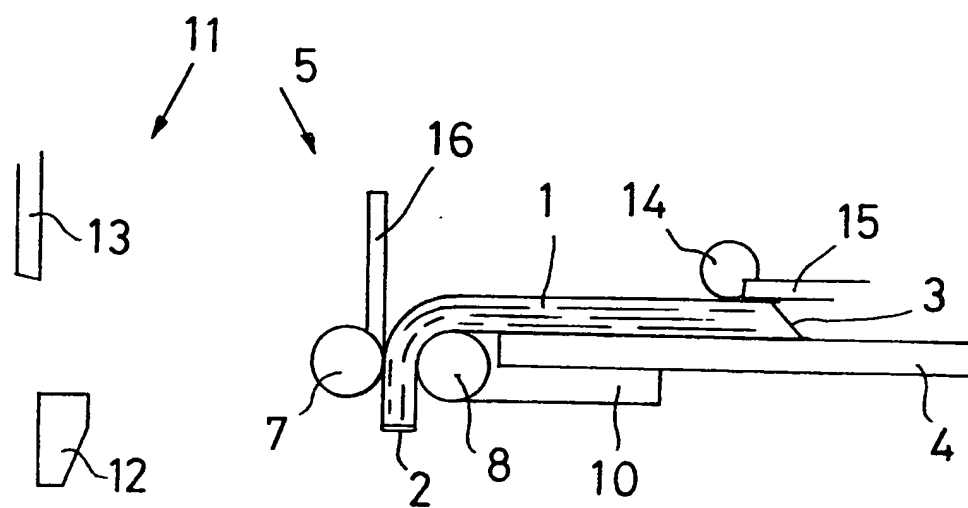


Fig 3

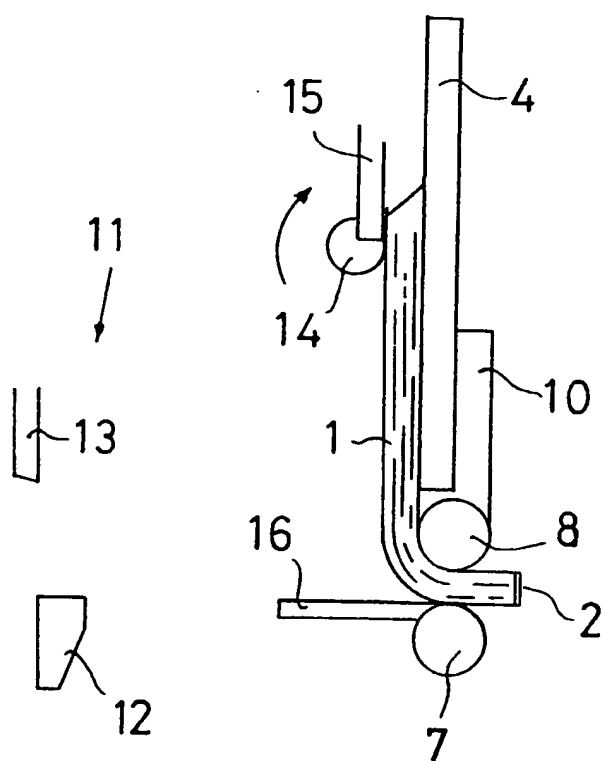


Fig 4

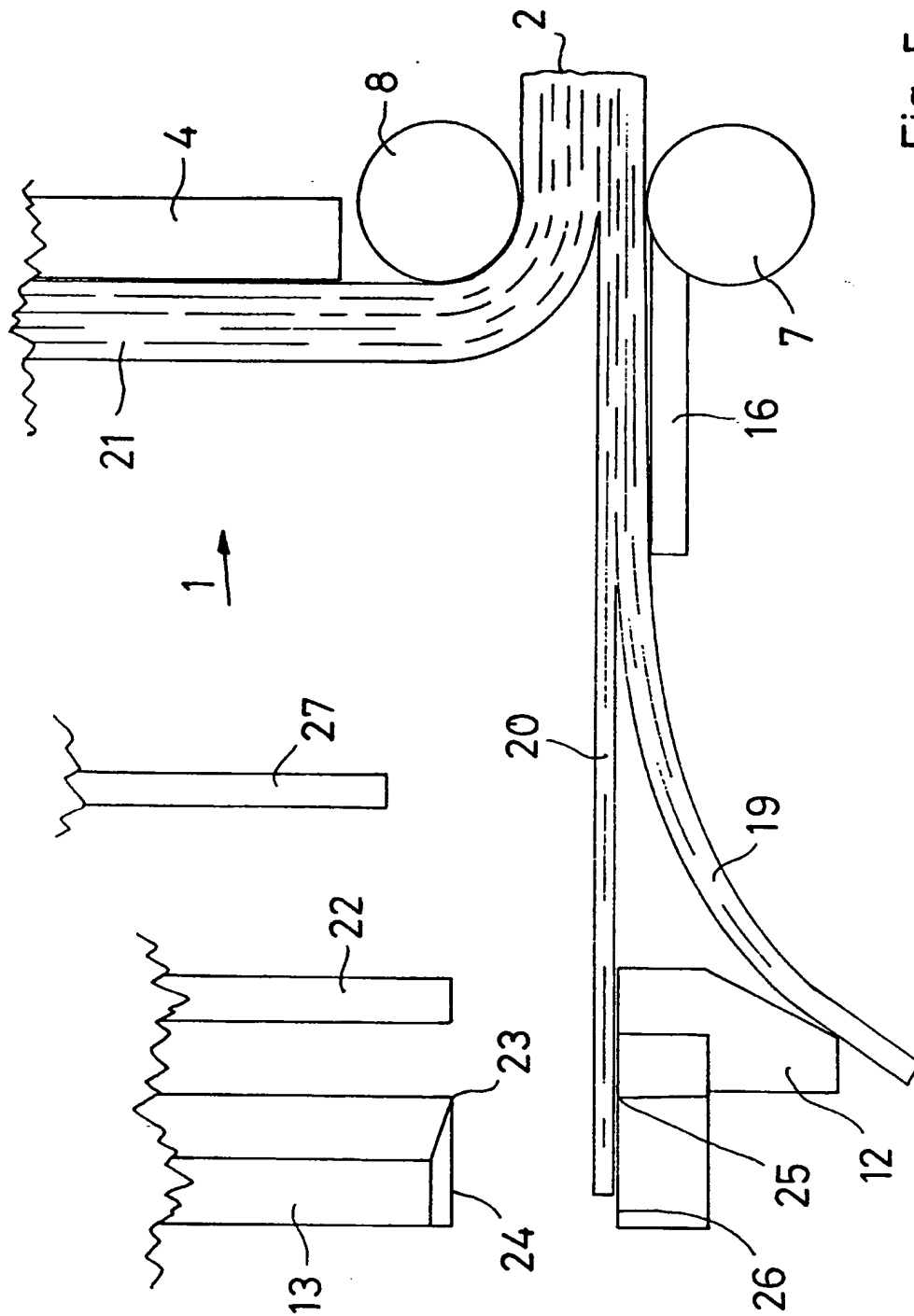
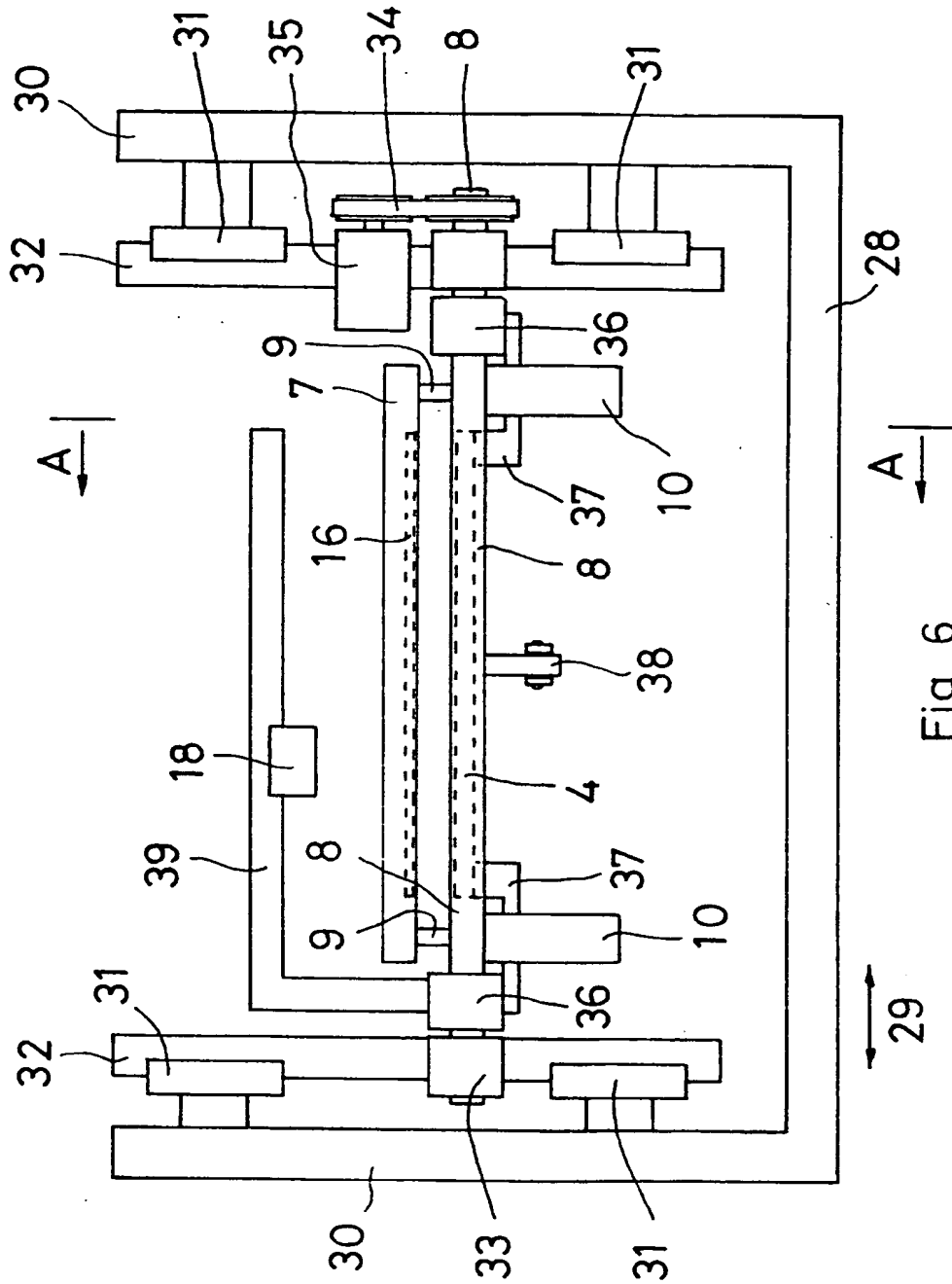


Fig 5



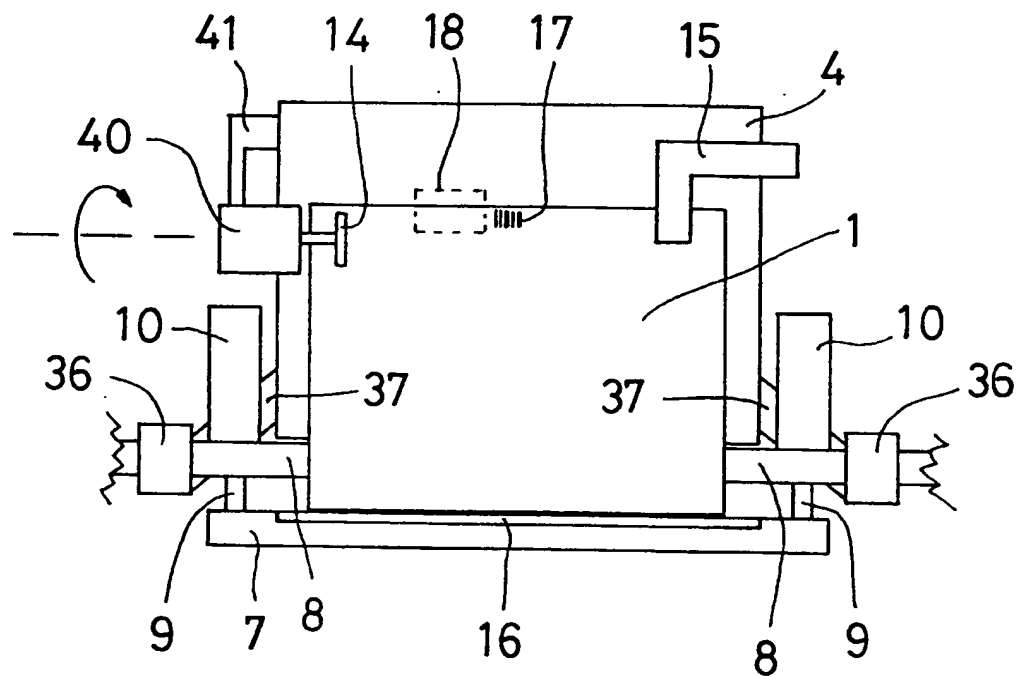


Fig 7

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 93/00459

## A. CLASSIFICATION OF SUBJECT MATTER

IPC5: B26D 3/14, B42F 21/12

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC5: B26D, B42F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE, B, 2300518 (GRUNER + JAHR GMBH & CO), 18 May 2300 (18.05.00)  -----	1,8

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

## \* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

1 Sept 1993

Date of mailing of the international search report

03-09-1993

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### Information on patent family members

**30/07/93**

International application No.

**PCT/SE 93/00459**

Form PCT/ISA/210 (patent family annex) (July 1992)